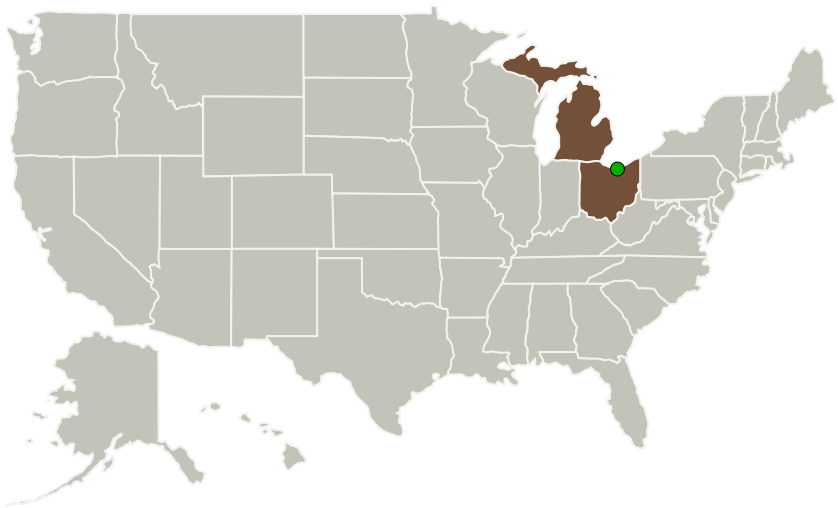
Optical Mach Probe, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

Michigan Aerospace Corporation (MAC) proposes to advance NASA's nonintrusive spatially- and temporally-resolved Interferometric Rayleigh Scattering (IRS) technology to perform additional multiple properties measurements in high-speed flows. In particular, an instantaneous nonintrusive Optical Mach Probe (OMP) to obtain the Mach number and the flow angularity among the flow density, translational temperature, and the bulk velocity is proposed. Other turbulence-specific parameters, such as components of the stress and heat flux tensors, the mean and fluctuations of properties are obtained from these measurements. During Phase I of this effort, the optical, mechanical, electrical, and software engineering models of the instrument will be developed for the specific application. The prototype development and preliminary tests to demonstrate the technique could be performed in Phase II at NASA through the adaptation of NASA's existing technologies. This proposal is in response to the NASA SBIR Phase I, Topic: A4 Aeronautics Test Technologies, Subtopic: A4.01 Ground Test Techniques and Measurement Technology. The objective is to develop and demonstrate nonintrusive measurement technologies to increase techniques' capabilities and characterize ground test facility flow performance in terms of flow quality, turbulence intensity, and Mach number measured up to and including hypersonic speed regimes.

Primary U.S. Work Locations and Key Partners



Optical Mach Probe, Phase I

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Michigan Aerospace Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Michigan Aerospace Corporation	Lead Organization	Industry	Ann Arbor, Michigan
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Michigan	Ohio

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138394)*

Project Management

Program Director:

Jason L Kessler

Program Manager:

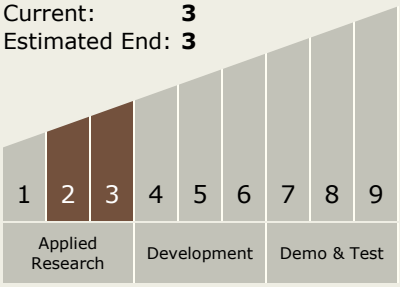
Carlos Torrez

Principal Investigator:

Daniel Bivolaru

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.1 Aerodynamics

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System